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INTRA-FAMILY RELATIONSHIPS IN PERSONALITY TEST PERFORMANCE*

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The problem, to what extent do members of a family resemble one another in mental characteristics, is important in connection with the problems of heredity and environment and of the mechanism of traits.

The term characteristic is used here to include both abilities and consistent behavior tendencies not involving ability. Mental ability is typified by intelligence test performance, and intra-family relationships in such performance have been explored with a fair degree of thoroughness. Outside the category of abilities we find the various dimensions of temperament, personality, attitudes, character, values, and interests, and in respect to these the quantitative study of intra-family relationships has to a large extent awaited the development of modern standardized tests. We shall be concerned in the present discussion primarily with personality in the narrow sense, and the term "personality test" will be used to denote questionnaire tests to which the trait names neuroticism, introversion, dominance (ascendance), and self-sufficiency have been assigned, together with one or two special scales closely allied to these. Attitude scales, which include all scales specifically labeled as such, constitute a separate category. The theoretical relation between these two categories is a problem in itself, but one which does not immediately concern us. The distinction is necessary for the purposes of this paper primarily as a convenience in treating the literature.

A point of usage concerns the word "sibling." In psychological literature the term is frequently used to exclude twins. This practice is not authorized either by Warren's *Dictionary of Psychology* nor by Webster's nor Funk and Wagnall's general dictionary. It will be adopted in this paper, however, as consistent with current usage, and as the easiest solution to a minor terminological problem.

* Recommended for publication by Dr. Edmund S. Conklin, Dec. 15, 1937.

Material on intra-family relationships in personality test scores has appeared within the present decade only. The volume of it is such, however, that a general summary may at this time be justified. The main purpose of this paper is twofold: 1. To provide such a summary, and 2. To report a study contributing new data on parent-child, sibling, and marital relationships. The table in Appendix I sets forth the studies, including the present one, in such detail as the tabular method permits. The historical section will serve, not as a critique of individual investigations, but as a statement of the salient features of the results as a whole.

Attitude scales are used almost as extensively as personality tests in intra-family studies, and the two sets of results seem to differ in a systematic way. The table in Appendix I is limited to personality. The historical section, however, will indicate the highlights of the attitude data, as well as of varous miscellaneous traits which have been studied on a smaller scale, and will state briefly for comparison the findings on achievement, ability, and physical traits.

The figures are in such a range that relatively few of the differences between individual correlations are statistically reliable, but certain implications are indicated clearly when the data are considered in the mass. The emphasis throughout will therefore be on the weight of evidence bearing on a few main points rather than on precise evaluation of specific figures.

Certain points of policy in treatment of the literature deserve mention. In the interest of comparability, raw correlations are quoted, and statistical corrections, unless otherwise noted, left out of account. The most obvious correction is that for attenuation, which would raise the general level of the correlations slightly, but certainly not enough to modify our inferences. When a study provides correlations on overlapping populations, or with overlapping scales, all such correlations have been included in the averages. Cases in which this procedure might significantly influence the results are noted. The averages computed are based on studies differing widely in details, as well as in amount of data contributed; the averages therefore should be considered as merely rough indices of general level. The justification for this method of treating the data is set forth in the discussion.

The correlations on ability traits quoted for comparison pertain to subjects living in their natural homes. Correlations on foster

children, foster siblings, and twins reared apart are usually lower. For a review of this literature see Schwesinger (28).

Historical

Our appended table includes only personality studies in which the current questionnaire type of test was used. There is a mass of clinical literature on the relation of family background to personality, and with this we are not immediately concerned. The much-quoted earlier study by Pearson (23), based on ratings by teachers, does not appear in the table. It is relevant, however, because certain of the traits covered fall into our personality category. In connection with his extensive study of inheritance Pearson obtained from a large number of school teachers data on the traits of siblings among their pupils. For most of the so-called mental traits each child was rated by his teacher on a 3-step scale. "Mental traits" other than abilities included in the study are vivacity, self-assertiveness, introspection, popularity, conscientiousness, and temper. Correlations between siblings, each based on over 500 cases, were found to range between +.43 and +.63, with a general average close to +.50, and with no considerable difference between brothers, sisters, and mixed pairs. These figures are clearly in a higher range than most of the recent data obtained by the questionnaire test technique. This work was criticized by Spearman (29) in 1904, chiefly in respect to the following two points: 1. The unreliability of the rating procedure, and, 2. a failure to allow in the interpretation for the unknown influence of similar school environments. More recent work on rating methods suggests also that a spurious element may have been contributed to the correlations by an uncontrolled tendency for a teacher to rate two members of a family as similar. We cannot, therefore, take Pearson's correlations of +.50 at their face value. It does not necessarily follow, of course, that the more recent correlations in a lower range give a better answer to the common underlying problem; each set of data must be evaluated on its merits. Coming to studies involving standardized tests, it will be convenient to present the personality material first, and other material for comparison under separate section headings.

Personality: Correlations on the various types of intra-family relationship have been reported as follows:

On identical twins, the highest correlations in the personality group, ranging from +.43 to +.75, with an average at +.59 (Carter, 3, with the four scales of the Bernreuter test; Newman, Freeman, and Holtzinger, 21, with the Woodworth-Mathews).

On fraternal twins, from −.14 to +.40 with an average at +.22 (Carter, 3, with the Bernreuter test; Newman, Freeman, and Holzinger, 21, with the Woodworth-Mathews).

On siblings, in the various sex combinations, from +.04 to +.38, with an average at +.17 (Hartshorne, May, and Shuttleworth, 10, with the Woodworth-Mathews; Koch and Stroud, 15, with a special test for neuroticism and with the Neymann-Kohlstedt test for introversion-extroversion; Pintner and Forlano, 25, with a special test for a composite of traits).

On parents and children, in the various sex combinations, from −.13 to +.54, with an average at +.14 (Crook and Thomas, 4, with the Allport Ascendance-Submission Test; Hoffeditz, 11, with the Bernreuter; Sward and Friedman, 34, with the Bernreuter; Ushijima, 37,[1] with Awaji and Okabe's test for introversion).

On husbands and wives, from −.11 to +.42, with an average at +.14 (Schiller, 26, with a special test for neuroticism; Crook and Thomas, 4, with the Allport Ascendance-Submission; Hoffeditz, 11, with Bernreuter; Sward and Friedman, 34, with the Bernreuter; Schooley, 27, with the Willougby revision of the Thurstone; Willoughby, 40, with the original Thurstone; Terman and Buttenmieser, 35, with the Bernreuter).

It should be pointed out that in some studies three or four correleations have been obtained on one population with the different scales of the Bernreuter test. All such correlations were counted as independent items in computing the above averages. To determine whether this overloading with the Bernreuter test significantly affects the picture, the general averages were recomputed, with each Bernruter cluster reduced to one item—the mean of the cluster. The only change of more than two points in the above results is in the figure for fraternal twins, which is raised from +.22 to +.26.

Inclusion of results from the study here reported raises the sibling average from +.17 to +.18, raises the parent-child average from +.14

[1] Seen in abstract only.

to +.16, and lowers the marital average from +.14 to +.13. These changes are maximal, because they are based on full weight for each of the three Bernreuter scales used.

In summary, both blood relationships and marital, with the exception of twins, show a distribution of correlations around a mean in the neighborhood of +.15, with a considerable spread in each direction within each group. Correlations on identical twins fall in an entirely different range, with an average at +.59, and on fraternal twins at an intermediate level, with an average at +.22. The validity of these comparisons is, of course, impaired by the fact that the averages are not based on strictly equivalent test batteries for the various relationships, but no differences between scales or traits have appeared systematically enough to seem significant in the present connection.

Attitudes: Attitude data based on contemporary scales are available for all intra-family types except twins. The summary is as follows:

On siblings, in the various sex combinations, from +.29 to +.60, with an average of +.40 (Kulp and Davidson, 16, with the Neumann, Kulp, and Davidson International Attitude Test; Newcomb and Svehla, 20, with the Thurstone scales on the church, war, and communism).

On parents and children, in the various sex combinations, from −.10 to +.77, with an average at +.49 (Morgan and Remmers, 19,[2] with the Harper "Social Study" for liberalism and conservatism; Kirkpatrick and Stone, 14,[3] with the Belief Pattern Scale for religious attitudes; Kirkpatrick, 13,[4] with the Belief Pattern Scale for Measuring Attitudes toward Feminism; Newcomb and Svehla, 20,[5] with the Thurstone scales on the church, war, and communism).

On husbands and wives, from +.38 to +.76, with an average at +.59 (Schiller, 26,[6] with a special public opinion questionnaire covering several topics; Morgan and Remmers, 19,[7] with the Harper "Social Study" for liberalism and conservatism; Kirkpatrick

[2] Less than 20 cases.
[3] Rho's instead of *r*'s.
[4] Correlations from several overlapping populations included in the averages.
[5] See footnote 4.
[6] Shephard's U instead of *r*.
[7] See footnote 2.

and Stone, 14,[8] with the Belief Pattern Scale for religious attitudes; Schooley, 27, with the Thurstone scales for communism and birth control; Newcomb and Svehla, 20,[9] with the Thurstone scales on the church, war, and communism).

The sibling and parent-child attitude averages are heavily weighted with the Newcomb and Svehla data, which are in a higher range than those for other studies. Without them these averages would be in the .30's. Several additional attitude studies are reported to be under way, but the results are not yet available. The above data justify the generalization that sibling and parent-child attitude correlations show averages in the .30's or .40's, with the latter higher than the former, and husband-wife correlations in the high .50's. The point to be emphasized here is that the general level of these averages is considerably higher than of those for personality test scores, and inspection for overlapping suggests that this diference is real.

Temperament, Character, and Miscellaneous: Correlations for four dimensions of will-temperament have been reported on identical twins, ranging from +.31 to +.82, with an average at +.53, and on fraternal twins from +.37 to +.79, with an average at +.60 (Newman, Freeman, and Holzinger, (21), p. 97, with the Downey test). With age partialed out the averages become +.44 on identical twins and +.52 on fraternal. We have here the unusual case of a group of traits in which identical twins show no higher correlations than do fraternal twins.

In their extensive study of character, Hartshorne, May, and collaborators, (8, 9, 10, 18), obtained sibling relationships as follows:[10] on persistence and inhibition, which might more reasonably be classified under temperament than under character in the narrow sense, correlations ranging from +.14 to +.46, with an average at +.28 (9, pp. 408, 409); on self-sacrifice and service, ranging from +.05 to +.40, with an average at +.21 (9, pp. 40, 202, 268); on cheating, from +.21 to +.44, with an average at +.32 (8, p. 232, 18); on moral knowledge, from +.29 to +.38, with an average at +.33 (10, p. 126).

[8] See footnote 3.
[9] See footnote 4.
[10] One block of correlations which Hartshorne and May believe to contain a large collusion factor is omitted.

The parent-child correlation on moral knowledge was found to be approximately +.50 and the husband-wife correlation +.65 (10, p. 98).

For suggestibility, a sibling correlation of +.11 has been obtained (Hartshorne, May, and Shuttleworth, 10, p. 126). Suggestibility is here classed as a miscellaneous trait because the Otis test used is more of the performance than the questionnaire type.

Marital correlations on the Allport-Vernon Study of Values, which is not clearly to be classified either as a personality or as an attitude test, have been obtained ranging from +.23 to +.45, with an average at +.36 (Schooley, 27).

Achievement and Abilities: Identical twins have shown an average correlation in educational achievement of +.92, fraternal twins, of +.86 (Newman, Freeman, and Holzinger, 21, p. 97),[11] and other siblings in the neighborhood of +.40 (Starch, 32, 33).

For general verbal intelligence, correlations on identical twins have been reported in the neighborhood of +.90, on fraternal twins in the .60's, and on other siblings and on parents-children averaging in the .40's. (Some major sources are, on twins, Newman, Freeman, and Holzinger, 21, on other relationships, the various studies in the well-known 27th Yearbook, 36. For summaries of the literature, see Pintner, 24, p. 509 ff., Schwesinger, 28, pp. 181 ff., 231 ff., 235 ff., and Anastasi, 1, pp. 108 ff, 112 ff.)[12] Marital correlations have been ported in the neighborhood of +.50 (summarized by Jones, 12).

There is some indication that non-verbal and specific ability tests show intra-family correlations in a somewhat lower range than those for general verbal intelligence (Willoughby, 38; McNemar, 17; Frye, 6; Anastasi, 1, p. 109 ff.).

Physical Traits: Correlations in physical traits have usually been reported ranging around +.50 on parents-children and siblings (*e. g.*,

[11] Newman, Freeman, and Holzinger report most of their correlations both in the zero order and with age partialed out. The partials are not quoted here except for will-temperament. On educational achievement they reduce the correlations on identical and fraternal twins by approximately .10 and .20 respectively. For measures of physical size they reduce the correlations on fraternal twins by approximately .15. In other cases they make no significant difference.

[12] The figures here given on achievement, abilities, and physical traits are obtained largely from secondary sources; where such sources disagree our figures represent a consensus estimate rather than a revaluation of the original literature.

Pearson & Lee, 22), and +.90 or over on identical twins (Newman, Freeman, and Holzinger, 21, p. 97). The marital correlation in physical traits is in the neighborhood of +.25 (summarized by Jones, 12).

The Present Study

The subjects in this investigation were siblings enrolled at the University of California at Los Angeles, and their parents. Siblings were identified from the university records. A few students were discovered by chance having siblings temporarily or recently out of school, or enrolled in other institutions. Such cases were included. Twins, while not systematically eliminated, were negligible in number.

The Bernreuter Personality Inventory was used. This test consists of 125 items, and provides scores on several different scales. Each item is given a separate weight for each scale. The test was designed to measure neuroticism, introversion, dominance, and self-sufficiency. A factor-analysis by Flanagan (5) provides two additional scales, tentatively labeled "self-confidence" and "sociability." In this study blanks were scored for three of the original traits—neuroticism, dominance, and self-sufficiency; introversion was dropped because of the high correlation between the introversion and neuroticism scales.

Split-half reliabilities for the several scales on various age groups have been reported from +.78 to +.91 (2, 30). In the present study split-half reliabilities were computed by correlating the first page and first half of third page against second page and second half of third page, and correcting by the Spearman-Brown formula. The figures on the various age and sex groups, in order for the three scales, neuroticism, dominance, and self-sufficiency, are: sons (N = 133), +.91, +.89, +.82; daughters (N = 110), +.91, +.90, +.87; fathers (N = 84), +.96, +.88, +.79; mothers (N = 71), +.92, +.92, +.87.

Solicitation of subjects was carried out by student assistants;[13] one or both siblings were approached and requested to take blanks for themselves and their families, to be filled out at their convenience and returned. Returns were accepted from one or both parents, and no record was made of the number of living parents in a family. Cases were added until at least 50 pairs were obtained in each of the

[13] Miss Patricia Dalmon and Miss Viola Loken.

sibling sex combinations, which automatically gave more than 50 in each of the parent-child relationships. The usual warning against collaboration was, of course, given, though on this point we have no absolute check; this constitutes probably the greatest single disadvantage of this procedure.

Less than 10% of the students approached refused to cooperate. In a previous study on parent-child relationships in ascendance-submission (4) solicitation had been by request in class for volunteers. It was found that those who volunteered to take blanks to their parents had higher ascendance scores on the average than those who did not. The present procedure was more laborious, but was required by the circumstances of the problem, and had the additional advantage of eliminating this error in sampling.

Results: Scoring was checked on a sampling of 24 blanks, and the average error of scoring found to be approximately 2 points per blank. The spread of scores on the Bernreuter scales makes this error inconsequential.

Product-moment r's were computed by single entry. In the case of brother-brother and sister-sister the division was older versus younger. For the parent-child correlations one or the other of a pair of like-sex siblings was picked at random, so that in any given correlation each case represents a separate family.

Basic correlations to which the above comments pertain, both before and after correction for attenuation, are presented in Table 1. Probable errors are given. We are not concerned with critical ratios in particular cases, but the probable errors make clear that the general order of reliability of the correlations is low.

The sibling correlations are the main contribution of this study, because of the dearth of sibling data at the college level in the previous literature.

Clearest characteristic of the figures in Table 1 is that they cover approximately the same range as the data reported by other investigators. Minor qualifications to this generalization are that our parent-child and our sibling r's are a little higher, and our marital r's a little lower, on the average, than those previously reported. The differences, however, are not conspicuous, and obviously deserve less emphasis than the similarities. Further points of interest will be taken up in the discussion.

TABLE 1.

Correlations for family relationships in 3 of the original Bernreuter scales. Corrections for attenuation are based on the split-half reliability figures obtained in this study.

	Number of pairs	Neuroticism Raw r	Neuroticism Corrected r	Dominance Raw r	Dominance Corrected r	Self-sufficiency Raw r	Self-sufficiency Corrected r
Brother-brother	50	.22 ±.091	.25	.08 ±.095	.09	—.06 ±.095	—.08
Brother-sister	56	.13 ±.088	.15	.08 ±.090	.10	.24 ±.085	.28
Sister-sister	51	.35 ±.083	.36	.30 ±.086	.33	.32 ±.085	.36
Father-son	62	.05 ±.085	.06	.04 ±.086	.05	—.02 ±.086	—.03
Father-daughter	64	.23 ±.080	.24	.24 ±.080	.26	.33 ±.075	.39
Mother-son	68	.30 ±.074	.32	.20 ±.078	.22	.17 ±.079	.20
Mother-daughter	73	.57 ±.053	.63	.40 ±.066	.43	.12 ±.079	.13
Husband-wife	79	.06 ±.070	.07	—.05 ±.070	—.06	.00 ±.070	.01

Sub-scales: It will be noted that the father-daughter and mother-daughter correlations on dominance are +.24 and +.40 respectively, quite different from the figures of −.04 and −.07 obtained in a previous study with the Allport Ascendance-Submission Test (4). In an effort to obtain a somewhat more direct check on the earlier result, dominance sub-scales for the two sexes were constructed, each consisting of 20 items which the Bernreuter was found to have in common with the corresponding form of the Allport Ascendance-Submission Test. An item was considered equivalent on the Bernreuter and the Allport tests if it seemed to pertain to the same situation, though necessarily the form was different. The sub-scales for the two sexes had 15 items in common. A sub-scale was also constructed for neuroticism, consisting of 22 items which the Bernreuter was found to have in common with the Willoughby revision of the Thurstone. The Willoughby revision of the Thurstone consists of 25 highly selected items, and our sub-scale based on it must therefore be relatively homogeneous for neuroticism. The neuroticism

sub-scale, however, was found to have 5 items in common with the masculine dominance sub-scale and 7 in common with the feminine.

Sub-scales were scored without item weighting, and correlations computed on the four parent-child relationships. Results are given in Table 2. Two points of significance are apparent:

1. The figures are in the same range as those from the general scales. There are differences in detail, but the differnces seem to be essentially random rather than systematic.

2. The correlations around zero previously obtained with the Allport Ascendance-Submission Test are clearly not supported.

TABLE 2.

Correlations based on sub-scales for Dominance and Neuroticism, constructed of items which the Bernreuter has in common with the Allport Ascendance-Submission Test and the Willoughby revision of the Thurstone test respectively.

	Neuroticism		Dominance	
	N	r	N	r
Father-son	68	—.02	72	.25
Father-daughter	65	.24	69	.36
Mother-son	74	.24	79	.17
Mother-daughter	73	.46	78	.21

Our data permit the computation separately of correlations between older siblings and parents and between younger siblings and parents. The significant comparison is, of course, between such correlations for older siblings and for younger siblings of the same sex. The value of our data for this purpose is limited by the following considerations: we know nothing of size of families except that one-child families are excluded; we have no information about birth order as between siblings included in the study and others not included; the populations on which such comparisons can be made are small. It is perhaps desirable, nonetheless, to have the figures on record, so they are presented in Table 3. The average age difference between older and younger siblings is well within the college range.

On the question whether older or younger siblings show greater similarity to parents, the 12 pairs of correlations divide six and six.

TABLE 3.

Correlations (r) of parents with older and with younger siblings separately.

	N	Neuroticism		Dominance		Self-sufficiency	
		Older	Younger	Older	Younger	Older	Younger
Father-son	30	.27	—.04	.15	.10	.44	.14
Father-daughter	28*	—.07	.15	.06	.15	.20	.33
Mother-son	33	.14	.17	.19	—.06	.06	.11
Mother-daughter	37	.50	.47	.40	.27	.05	.17

* Only 27 cases of younger siblings.

Discussion

The most significant comparisons which the data permit are those between the various trait categories and the various intra-family relationships. For the purpose of these comparisons, all the figures reported for a given trait category and on a given relationship (*e. g.*, personality on siblings) are treated as constituting a single distribution and an average is derived from them. This procedure can be considered as obscuring no important characteristic of the data on the assumption that the correlations in any one distribution vary in a random way only. It is contended, not that this assumption is 100% correct, but that it is a sufficiently good approximation for the purpose of our analysis. In other words, the variables which contribute to the spread of the distributions are more incidental than systematic. We can illustrate with the systematic factors of traits and tests. In the present study the neuroticism r's are higher than those for other traits in five of the seven relationships. This would seem to be a suggestive indication, but it is not borne out by Carter on either fraternal or identical twins, nor by Hoffeditz on three of the four parent-child relationships. When we attempt to account for contradictory results from different studies using the same test, several variables come into play and obscure the analysis. The above example involves the scales of the Bernreuter test only. Other personality tests have been used, but rarely two in any one study, so in comparing them secondary variables again confuse the interpretation. Even the studies which are in general most similar do not show an encouraging degree of agreement in results. For example, in the present study a mother-daughter correlation was obtained,

with the neuroticism scale of the Bernreuter test, of +.57. Sward and Friedman, with the same test, similar method of administration, and a student-body probably similarly constituted, obtained a mother-daughter correlation of +.11. The difference between these figures has a critical ratio of 4.5. This is an extreme, but not an otherwise exceptional, case. The entire picture is that of less systematic than random variation within the categories to which the distributions pertain.

As our comparisons are in terms of the averages of these distributions, some account should be taken of the reliability of the averages. Statistical reliability constants would have a spurious connotation of rigor for the analysis as a whole, but the distributions are presented in Fig. 1 to permit a visual judgment of the stability of the central tendencies, as well as to give a further impression of the total range of the data. The reader will probably agree that the averages represent the distributions well enough for our purpose. As a corollary, they indicate true relationships greater than zero.

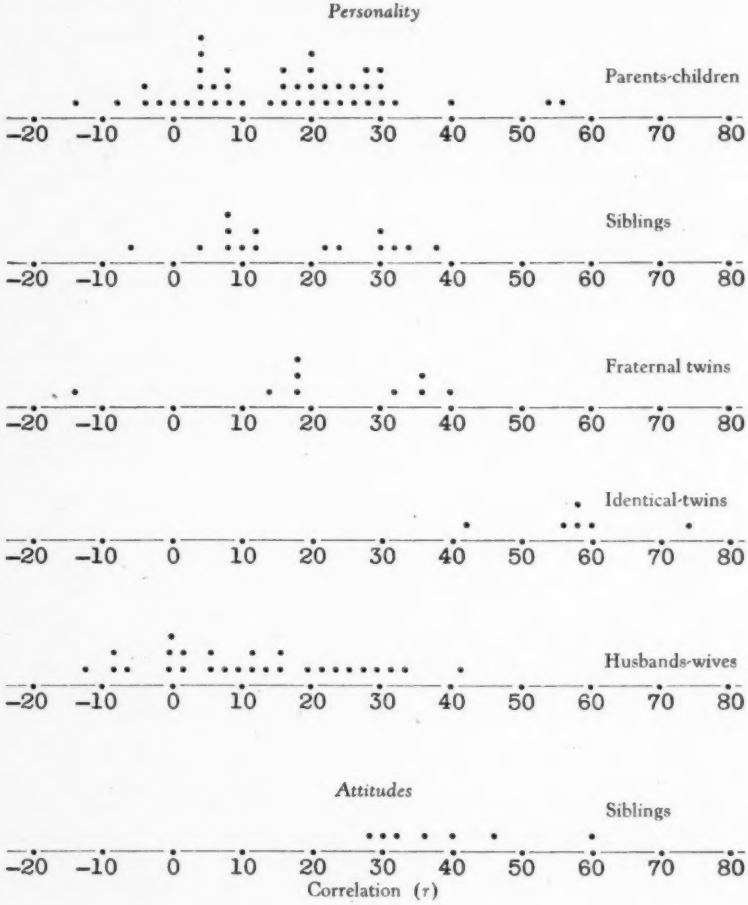
It might be suggested that the correlations measure collusion on the part of the subjects rather than genuine similarity. The Hoffeditz study is fairly critical for this point because in it many of the blanks were filled out in the presence of the investigator or an assistant. As the Hoffeditz correlations are typical of the date as a whole, it seems fair to dismiss the collusion hypothesis.

The suspicion recurrently arises that low correlations obtained with personality tests can be blamed on the unreliability of the tests. It seems advisable, therefore, to refer again to the split-half reliabilities obtained in this study, which are in the range of those usually reported with group intelligence tests. The greatest increase in a correlation in Table 1 caused by correction for attenuation is .07, and the average is in the neighborhood of .03. The most complete corrections could hardly cause changes in the averages of significance for the generalized comparisons with which we are concerned.

We can conclude, then, that our averages are adequate first approximations to the true intra-family similarities in personality test performance. The average of +.18 for siblings is very different from Pearson's correlations of ratings on mental traits in the neighborhood of +.50. In part the difference may be accounted for by the traits involved; in the questionnaire group we have neuroticism,

Figure 1.

Distributions of intra-family personality correlations. Data taken from the table in Appendix I. The suggestion of bimodality in some of the distributions has no ascertainable significance. The attitude distribution on siblings is included for comparison.



dominance, self-sufficiency, and introversion; in Pearson's group we have vivacity, self-assertiveness, introspection, popularity, conscientiousness, and temper. Operationally, moreover, a trait can be defined only with reference to the method of measurement, and the difference in method is large. Making due allowance for these considerations, it seems unlikely that self-assertiveness as rated by a second person would be fundamentally very different from dominance as measured by current tests, and it is probably safe to attribute a part of the difference in results to the constant errors already mentioned in Pearson's rating technique.

The marital correlations are in a class by themselves; they will be discussed separately, and neither the comments above nor those to follow apply to them except in the section on "marital data."

Heredity and environment: A quantitative treatment of heredity and environment is beyond the province of this paper, but it seems desirable to summarize those aspects of the data which have most relevance for the problem, and to indicate certain difficulties of interpretation.

Comparing the various types of family relationship, the personality correlations show the following rank order: siblings and parents-children at about the same low level, fraternal twins slightly higher, and identical twins much higher. The same rank order holds for intelligence test correlations. It is the order of genetic similarity, except that fraternal twins are higher than other siblings. It is also the order of environmental similarity, except that the sibling and parent-child correlations do not reflect the probable fact that the former have more similar environments than the latter. No conclusive inference from this rank order is apparent. Data available on other traits are only partly consistent with the above. The rank order on educational achievement is siblings, fraternal twins, and identical twins. Contrary to the personality and intelligence data, the jump from siblings to fraternal twins seems to be larger than that from fraternal twins to identical twins, which is reasonable for a type of performance determined by school experience. On attitudes and on moral knowledge, sibling and parent-child correlations are available, the latter being higher in both cases. Downey Will-Temperament correlations are available on twins; identical twins are no higher, possibly even lower, than fraternal twins. This result is puzzling because it would seem to suggest no genetic con-

tribution at all to this type of trait, which is contrary to the usual concept of temperament.

Coming to a comparison of the various trait categories, on siblings the correlation is highest for intelligence, next for attitudes and character, and lowest for personality. On parents-children the rank-order is the same for intelligence, attitudes, and personality (the character correlation, which is based on moral knowledge only, is too high to fit the pattern). On the two types of twins data are limited to intelligence and personality; here the rank order is consistent with that on the other relationships. As between intelligence and personality, it would be convenient to infer, from the higher intra-family correlations in the former, that the contribution of heredity is larger to intelligence than to personality. It is also true, however, that the attitude correlation is higher than the personality correlation. The proposition that heredity contributes more to attitudes than to personaliy is unacceptable because of the specific cultural reference of attitudes. The difference between the personality and attitude correlations can be accounted for, without the assumption of a significant hereditary factor in either trait, if we assume that the environmental factors which contribute to attitudes (*e. g.*, economic level) are more similar for two siblings, on the average, than are the environmental factors which contribute to personality (*e. g.*, early traumatic experiences). This assumption is not unreasonable. The inference suggested above with respect to personality and intelligence, that heredity contributes more to intelligence than to personality because the intra-family intelligence correlations are higher, depends on the contrary assumption—that the environmental factors which contribute to one trait are about as similar for two siblings, on the average, as those which contribute to another trait. As between intelligence and personality, this is very likely not true. It is probable that the difference between the intelligence and personality correlations is due in part to greater commonality for siblings of those environment factors which influence intelligence test scores than of those which influence personality, as well as in part to a greater hereditary contribution to intelligence than to personality. It is probable also that in this case the hereditary contribution is more important. As between personality and attitudes, it is probable that the relative commonality of environmental factors is more important.

Considerations of this type emphasize the complexity of the heredity and environment problem. Such factors as a difference in range between different populations with respect to a given set of determiners complicate it still further. The data here reviewed, though doubtful material for precision analysis, should at least provide useful guides for further theory.

Sex combinations: The data contain some indication of systematic differences between the sex combinations. These indications are statistically unimpressive, and do not invalidate our argument at the beginning of the discussion concerning the constitution of the distributions. They are reported, however, because they have some theoretical interest.

1. The proposition that the females of a family resemble one another more closely than do the males is supported in the present study by all six of the possible comparisons (three scales on siblings, three scales on parents-children), in the Pintner and Forlano study by the one comparison on siblings, in the Hoffeditz study by two of the three Bernreuter scales on parents-children, and in the Sward and Friedman study by two populations in three on parents-children. This analysis rests on direction of differences between correlations, and takes no account of reliability. The weight of evidence is positive, but not as positive as appears at first impression. Results from the three Sward and Friedman populations can be considered independent, but results from the three Bernreuter scales in each of the other studies are not independent, and the evidence is weakened accordingly. This point is relevant as well to the paragraphs below.

2. Daughters are more similar than sons, on the average, to parents regardless of sex of parent. This statement is supported by a preponderance of 5 to 1 in both the present study and that of Hoffeditz, but the Sward and Friedman data are evenly divided. As a simplifying hypothesis, possibly greater parental influence on the personality of daughters than of sons would account for point 1 as well as 2.

3. On the proposition that children resemble more closely parents of the same sex than of the opposite sex, the evidence tends to be positive. On the negative side of the balance we have four comparisons in six from the present study and one from the Crook and Thomas study. On the positive side we have all of the six comparisons from the Hoffeditz study, four in six from the Sward

and Friedman study, and one from the Ushijima study. This point is of interest because of its implication of Freudian identification.

Discounting for the commonality of the Bernreuter scales, we must recognize these tendencies as suggestive only. On other aspects of the problem the data show even less consistency than on the above. For example, it is reasonable to expect that the closer contact between mothers and children would result in greater personality similarity than between fathers and children, but there is little or no indication of such a difference.

Marital Data: The marital correlations, as stated above, deserve special comment. They are, of course, irrelevant to the problem of heredity and environment, but significant for the problem of assortative mating. The rank-order of various types of traits which holds for blood relationships is modified in the marital correlation; attitudes, for example, show a higher marital correlation than does intelligence, contrary to the rank order with siblings and with parents-children. The marital correlations in general are at least as high as those of parents-children and siblings, and are higher in the case of attitudes and moral knowledge. The implication is that assortative mating operates, with respect to the type of trait here considered, to perhaps a greater extent than with physical characteristics (on the latter, r averages +.25). Personality traits constitute the main exception with marital r's, like those for blood relationships, somewhere below +.20. A tendency appears for the marital r's in neuroticism to be larger than those for other personality traits. This indication appears in the present study, in that of Hoffeditz, and in that of Terman and Buttenmieser (except for the dominance r's in the Terman and Buttenmieser study). It is supported by the neuroticism r's of +.30 and +.27 by Schooley (27) and Willoughby (40) respectively, and by the introversion r of .00 by Schiller (26). With neuroticism, perhaps marital selection for similarity is least likely to be attenuated by selection for complimentation, as it might be, for example, with ascendance-submission.

The marital r on personality tests is approximately the same as the sibling and parent-child r if we consider the general average only. Sward and Friedman compared Jews with Gentiles. The marital r is clearly higher among Jews. The marital r for Jews, moreover, is higher than the parent-child r. For groups predom-

inantly Gentile, the present study shows the marital r's to be lower on the average than either the parent-child or the sibling r's, Sward and Friedman's Gentiles show the marital r's lower on the average than the parent-child r's in both the college and high school groups, while Hoffeditz's results show no definite tendency. In the Sward and Friedman data there is even a hint, though a less conclusive one, of higher parent-child r's among Jews. It is not improbable that cultural factors could cause such a difference, even as between two Gentile groups.

Item Analysis: The Flanagan scales, devised by a factor analysis technique for use with the Bernreuter test, typify a considerable amount of current work directed toward a reinterpretation of personality dimensions (e.g., 5, 7, 31, 39). The Flanagan scales were not used in the study here reported because the basic correlations were computed before these scales became available. It is unlikely that the use of the new scales would add anything not brought out equally well by an analysis of the data by items. An item analysis is under way, and the results will eventually be forthcoming if they seem to merit publication.

Summary and Conclusions

The literature on intra-family relationships in personality test performance is reviewed, "personality test" being defined in the narrow sense, covering mainly the traits of neuroticism, introversion, dominance, and self-sufficiency. A new study is reported providing correlations with the Bernretuter test on siblings in a college population, on parents-children, and on husbands-wives.

It is concluded that:

1. In studies of the kind here considered, results sometimes differ widely for reasons that are not apparent.

2. In spite of (1) above, the average level of the personality correlations on each of the major family relationships is fairly definitely indicated; these average levels are: on identical twins, +.59, on fraternal twins, +.22, on siblings, +.18, on parents-children, +.16, and on husbands-wives, +.11.

3. These figures are definitely lower than on any other type of trait heretofore adequately reported, e.g., physical characteristics, intelligence, attitudes, and character.

4. There is a slight, though not at all a conclusive, indication in the literature, that personality traits of daughters are subject to more parental influence than those of sons, and that children tend to identify more with the parent of the same than of the opposite sex.

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APPENDIX I

Intra-family correlations in personality test performance.

Relationship	Author	Trait	Test	N	Raw r
Twins					
Identical	Newman, Freeman, & Holzinger	Neuroticism	Woodworth-Matthews	50	+.56[1]
	Carter	Neuroticism	Bernreuter	40	+.61
	Carter	Introversion	Bernreuter	40	+.43
	Carter	Dominance	Bernreuter	40	+.75
	Carter	Self-sufficiency	Bernreuter	40	+.59
Fraternal (Like sex)	Newman, Freeman, & Holzinger	Neuroticism	Woodworth-Matthews	50	+.37[1]
	Carter	Neuroticism	Bernreuter	43	+.32
	Carter	Introversion	Bernreuter	43	+.40
	Carter	Dominance	Bernreuter	43	+.34
	Carter	Self-sufficiency	Bernreuter	43	—.14
Fraternal (Unlike sex)	Carter	Neuroticism	Bernreuter	35	+.18
	Carter	Introversion	Bernreuter	35	+.18
	Carter	Dominance	Bernreuter	35	+.18
	Carter	Self-sufficiency	Bernreuter	35	+.13
Siblings					
Brother-brother	Pintner & Forlano	Composite	Special	41	+.04[2]
	Crook	Neuroticism	Bernreuter	50	+.22
	Crook	Dominance	Bernreuter	50	+.08
	Crook	Self-sufficiency	Bernreuter	50	—.06
Sister-sister	Pintner & Forlano	Composite	Special	35	+.31[2]
	Crook	Neuroticism	Bernreuter	51	+.35
	Crook	Dominance	Bernreuter	51	+.30
	Crook	Self-sufficiency	Bernreuter	51	+.32
Brother-sister	Pintner & Forlano	Composite	Special	51	+.13[2]
	Crook	Neuroticism	Bernreuter	56	+.13
	Crook	Dominance	Bernreuter	56	+.08
	Crook	Self-sufficiency	Bernreuter	56	+.24
Mixed	Koch & Stroud	Neuroticism	Special	162	+.10
	Hartshorne & May	Neuroticism	Woodworth-Matthews	—	+.38[3]
	Koch & Stroud	Extro.-Intro.	Neymann-Kohlstedt	162	+.09

Relationship	Author	Trait	Test	N	Raw r
Parent-Child	Hoffeditz	Neuroticism	Bernreuter	—	+.06[4]
Father-son	Sward & Friedman	Neuroticism	Bernreuter	56	+.29[5]
	Sward & Friedman	Neuroticism	Bernreuter	56	+.31
	Sward & Friedman	Neuroticism	Bernreuter	23	—.13
	Crook	Neuroticism	Bernreuter	62	+.04
	Hoffeditz	Dominance	Bernreuter	—	+.19[4]
	Crook	Dominance	Bernreuter	62	+.04
	Hoffeditz	Self sufficiency	Bernreuter	—	+.20[4]
	Crook	Self sufficiency	Bernreuter	62	—.02
Father-daughter	Hoffeditz	Neuroticism	Bernreuter	—	+.23[4]
	Sward & Friedman	Neuroticism	Bernreuter	58	+.24[5]
	Sward & Friedman	Neuroticism	Bernreuter	58	+.05
	Sward & Friedman	Neuroticism	Bernreuter	56	+.14
	Crook	Neuroticism	Bernreuter	64	+.23
	Ushijima	Introversion	Awaji & Okabe	73	+.21[6]
	Hoffeditz	Dominance	Bernreuter	—	+.20[4]
	Crook & Thomas	Dominance	Allport A-S	47	—.04
	Crook	Dominance	Bernreuter	64	+.24
	Hoffeditz	Self-sufficiency	Bernreuter	—	+.09[4]
	Crook	Self-sufficiency	Bernreuter	64	+.33
Mother-son	Hoffeditz	Neuroticism	Bernreuter	—	+.01[4]
	Sward & Friedman	Neuroticism	Bernreuter	56	+.16[5]
	Sward & Friedman	Neuroticism	Bernreuter	56	+.27
	Sward & Friedman	Neuroticism	Bernreuter	23	—.08
	Crook	Neuroticism	Bernreuter	68	+.30
	Hoffeditz	Dominance	Bernreuter	—	+.02[4]
	Crook	Dominance	Bernreuter	68	+.20
	Hoffeditz	Self-sufficiency	Bernreuter	—	+.05[4]
	Crook	Self-sufficiency	Bernreuter	68	+.17
Mother-daughter	Hoffeditz	Neuroticism	Bernreuter	—	+.27[4]
	Sward & Friedman	Neuroticism	Bernreuter	58	+.31[5]
	Sward & Friedman	Neuroticism	Bernreuter	58	+.11
	Sward & Friedman	Neuroticism	Bernreuter	56	—.04
	Crook	Neuroticism	Bernreuter	73	+.57
	Ushijima	Introversion	Awaji & Okabe	73	+.30[6]
	Hoffeditz	Dominance	Bernreuter	—	+.28[4]
	Crook & Thomas	Dominance	Allport A-S	71	—.07
	Crook	Dominance	Bernreuter	73	+.40
	Hoffeditz	Self-sufficiency	Bernreuter	—	+.17[4]
	Crook	Self-sufficiency	Bernreuter	73	+.18
Father-offspring (mixed)	Sward & Friedman	Neuroticism	Bernreuter	40	+.05[5]
	Sward & Friedman	Neuroticism	Bernreuter	40	+.06

Mother-offspring	Sward & Friedman	Neuroticism	Bernreuter	40	+.085
(mixed)	Sward & Friedman	Neuroticism	Bernreuter	40	+.54
Husband-wife	Hoffeditz	Neuroticism	Bernreuter	—	+.164
	Sward & Friedman	Neuroticism	Bernreuter	56	+.345
	Sward & Friedman	Neuroticism	Bernreuter	58	+.335
	Sward & Friedman	Neuroticism	Bernreuter	40	+.425
	Sward & Friedman	Neuroticism	Bernreuter	40	+.20
	Sward & Friedman	Neuroticism	Bernreuter	56	+.12
	Sward & Friedman	Neuroticism	Bernreuter	58	—.11
	Sward & Friedman	Neuroticism	Bernreuter	23	—.08
	Sward & Friedman	Neuroticism	Bernreuter	56	+.01
	Schiller	Neuroticism	Special	46	+.027
	Schooley	Neuroticism	Willoughby	80	+.304
	Willoughby	Neuroticism	Thurstone	—	+.278
	Terman & Buttenmieser	Neuroticism	Bernreuter	126	+.119
	Terman & Buttenmieser	Neuroticism	Bernreuter	215	+.229
	Crook	Neuroticism	Bernreuter	79	+.06
	Schiller	Introversion	Whitmans	46	.007
	Terman & Buttenmieser	Introversion	Bernreuter	126	+.029
	Terman & Buttenmieser	Introversion	Bernreuter	215	+.179
	Hoffeditz	Dominance	Bernreuter	—	+.15
	Crook & Thomas	Dominance	Allport A-S	66	—.07
	Terman & Buttenmieser	Dominance	Bernreuter	126	+.249
	Terman & Buttenmieser	Dominance	Bernreuter	215	+.299
	Crook	Dominance	Bernreuter	79	—.05
	Hoffeditz	Self-sufficiency	Bernreuter	—	+.09
	Terman & Buttenmieser	Self-sufficiency	Bernreuter	126	+.079
	Terman & Buttenmieser	Self-sufficiency	Bernreuter	215	+.129
	Crook	Self-sufficiency	Bernreuter	79	.00

Table is limited to personality as measured by questionnaire tests (the Ushijima data constitute a minor exception). For some of the studies the numbers of cases could not be definitely determined; of these, the Hoffeditz N's are probably above 40, and the Willoughby N in the neighborhood of 100. The twin and sibling populations, and the younger generation of the parent-child populations, are from college or high school unless otherwise stipulated. The marital populations are parents of the above unless otherwise stipulated.

[1] School population—8-18 years. [2] School population—4th to 8th grade. [3] School population—5th to 8th grade. [4] The Hoffeditz and the Schooley studies sample the general population. [5] Jews. [6] Parent rated by daughter. [7] Homogeneous adult population. [8] Population of professional people. [9] Population of educated American stock; figures given by Terman & Buttenmieser on divorced couples not listed above.